



Bauer et al., Serial No. 09/529,028

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Please amend claims 13, 19, 21, 24, and 38, and add new claims 42-52 as follows:

13. (amended) A composite comprising

Aa) at least one first layer which comprises a mixture Ia, comprising a mix IIa consisting of

a) from 1 to 95% by weight, based on mix IIa, of an inorganic solid which conducts Li ions [~~a solid III, preferably a basic solid II~~],

having a primary particle size of from 5 nm 20 μ m and

b) from 5 to 99% by weight, based on mix IIa, of a polymeric composition IV obtained [~~obtainable~~] by polymerization of

b1) from 5 to 100% by weight, based on the composition IV, of condensation product V of

α) at least one compound VI which is able to condense with a carboxylic acid or a sulfonic acid as defined in β or a derivative or a mixture of two or more thereof, and

β) at least 1 mol per mol of the compound VI of a carboxylic acid or sulfonic acid VII which contains at least one free-radically polymerizable functional group, or a derivative

thereof or a mixture of two or more thereof,

and

- b2) from 0 to 95% by weight, based on the composition IV, of a further compound VIII, having a mean molecular weight (number average) of at least 5000 and polyether segments in the main chain or a side chain, where the proportion by weight of the mix IIa in the mixture Ia is from 1 to 100% by weight, and the layer is free of an electron-conducting, electrochemically active compound,

and

- B) at least one second layer which comprises a polymeric binder and an electron-conducting, electrochemically active compound,

wherein the first layer or layers and the second layer or layers are joined to one another by one of the two methods V1 or V2:

- V1) Lamination of the first layer or layers with the second layer or layers under the action of heat or under the action of heat and pressure, or
- V2) Corona treatment of the first layer or layers and the second layers or layers and subsequent bringing together of the corona-treated first layer or layers with the corona-treated second layer or layers.

19. (amended) A process for producing a composite as claimed in claim 13, which comprises joining the first layer or layers and the second layer or layers [~~and, if present, the bonding layer or layers~~] to one another by hot lamination.
21. (amended) A process for producing a composite as claimed in claim 13, which comprises subjecting the first layer or layers or the second layer or layers or the first layer or layers and the second layer or layers to a corona treatment and subsequently bringing together [joining] the first corona-treated layer or layers to the second corona-treated or untreated layer or layers.
24. (amended) A method of [~~Method using a composite as claimed in claim 13 for~~] producing an electrochemical cell[;] in a sensor, an electrochromic window, a display, a capacitor or an ion-conducting film which comprises utilizing the composite of claim 13.
38. (amended) A method of producing [~~The use of the electrochemical cell as claimed in claim 27 as~~] an automobile battery, instrument battery, planar battery or polymer battery which comprises utilizing the electrochemical cell of claim 27.
42. (new) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is a basic solid.
43. (new) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is selected from the group consisting of lithium borates, lithium aluminates, lithium aluminosilicates, mica, lithium zeolites, lithium carbides, Li_3N , lithium oxides, mixed lithium oxides, Li_2NH , LiNH_2 , lithium phosphates, Li_2CO_3 ,

lithium silicates, and lithium sulfates, and also two or more of the abovementioned solids which conduct Li ions.

44. (new) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is selected from the group consisting of $\text{Li}_4\text{B}_6\text{O}_{11} \cdot x\text{H}_2\text{O}$, $\text{Li}_3(\text{BO}_2)_3$, $\text{Li}_2\text{B}_4\text{O}_7 \cdot x\text{H}_2\text{O}$, LiBO_2 , where x can be from 0 to 20; $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$, $\text{Li}_2\text{Al}_2\text{O}_4$, LiAlO_2 ; lithium-containing zeolites, feldspars, feldspar substitutes, phyllosilicates and inosilicates, $\text{LiAlSi}_2\text{O}_6$ (spodumene), $\text{LiAlSi}_4\text{O}_{10}$ (petullite), LiAlSiO_4 (eucryptite), $\text{K}[\text{Li},\text{Al}]_3[\text{AlSi}]_4\text{O}_{10}(\text{F-OH})_2$, $\text{K}[\text{Li},\text{Al},\text{Fe}]_3[\text{AlSi}]_4\text{O}_{10}(\text{F-OH})_2$; lithium zeolites in fiber, sheet or cube form; Li_2C_2 , Li_4C ; Li_3N ; LiAlO_2 , Li_2MnO_3 , Li_2O , Li_2O_2 , Li_2MnO_4 , Li_2TiO_3 ; Li_2NH ; LiNH_2 ; Li_3PO_4 , LiPO_3 , LiAlFPO_4 , $\text{LiAl}(\text{OH})\text{PO}_4$, LiFePO_4 , LiMnPO_4 ; Li_2CO_3 , Li_2SiO_3 , Li_2SiO_4 , Li_6Si_2 ; Li_2SO_4 , LiHSO_4 , and LiKSO_4 , and also mixtures of two or more of the abovementioned solids which conduct Li ions.
45. (new) A composite as claimed in claim 13, wherein the first layer or layers and the second layer or layers are joined to one another by the method V1 in the presence of a bonding layer or bonding layers.
46. (new) A composite as claimed in claim 45, wherein the bonding layer or layers is/are formed of polymeric compounds.
47. (new) A composite as claimed in claim 46, wherein the polymeric compounds are selected from the group consisting of polyethylene oxide; polyvinyl ethers; (co)polyacrylates, (co)polymethacrylates; polyvinylpyrrolidone; polyurethanes,

wax-like (co)polyolefins; rubber-like materials; and polyisobutylene; and also mixtures of two or more thereof.

48. (new) A composite as claimed in claim 46, wherein the polymeric compounds are selected from the group consisting of polyethylene oxide; poly(vinyl methyl ether), poly(vinyl ethyl ether), poly(vinyl propyl ether), poly(vinyl butyl ether), poly(vinyl isobutyl ether); polybutyl (meth)acrylate, polyhexyl (meth)acrylate; polyvinylpyrrolidone; polyurethanes, polyethylene, polypropylene waxes, polyisoprene waxes; rubber-like materials; and polyisobutylene; and also mixtures of two or more thereof.

49. (new) A composite comprising

Aa) at least one first layer which comprises a mixture Ia, comprising a mix IIa consisting of

a) from 1 to 95% by weight, based on mix IIa, of an inorganic solid which conducts Li ions, having a primary particle size of from 5 nm to 20 μm and

b) from 5 to 99% by weight, based on mix IIa, of a polymeric composition IV obtained by polymerization of

b1) from 5 to 100% by weight, based on the composition IV, of condensation product V of

α) at least one compound VI which is able to condense with a carboxylic acid or a sulfonic

acid as defined in β or a derivative or a mixture of two or more thereof, and

- β) at least 1 mol per mol of the compound VI of a carboxylic acid or sulfonic acid VII which contains at least one free-radically polymerizable functional group, or a derivative thereof or a mixture of two or more thereof,

and

- b2) from 0 to 95% by weight, based on the composition IV, of a further compound VIII, having a mean molecular weight (number average) of at least 5000 and polyether segments in the main chain or a side chain, where the proportion by weight of the mix IIa in the mixture Ia is from 1 to 100% by weight, and the layer is free of an electron-conducting, electrochemically active compound,

and

- B) at least one second layer which comprises a polymeric binder and an electron-conducting, electrochemically active compound,

wherein the first layer or layers and the second layer or layers are joined to one another by one lamination of the first layer or layers with the second layer or

layers under the action of heat or under the action of heat and pressure, in the presence of a bonding layer or bonding layers.

50. (new) A composite as claimed in claim 49, wherein the bonding layer or layer is/are formed of polymeric compounds.
51. (new) A process for producing a composite as claimed in claim 49, which comprises joining the first layer or layers and the second layer or layers and bonding layer or layers to one another by hot lamination.
52. (new) A process for producing a composite as claimed in claim 49, which comprises subjecting the first layer or layers or the second layer or layers or the first layer or layers and the second layer or layers to a corona treatment and subsequently bringing together the first corona-treated layer or layers to the second corona-treated or untreated layer or layers.
53. (new) A composite as claimed in claim 45, wherein the bonding layer or layers comprise(s) an inorganic solid which conducts Li ions and polymeric compounds.
54. (new) A composite as claimed in claim 49, the bonding layer or bonding layers comprise(s) and inorganic solid which conducts Li ions and polymeric compounds.

COPY OF ALL CLAIMS

13. (amended) A composite comprising

Aa) at least one first layer which comprises a mixture Ia, comprising a mix IIa consisting of

aaa) from 1 to 95% by weight, based on mix IIa, of an inorganic solid which conducts Li ions, having a primary particle size of from 5 nm to 20 μm and

bbb) from 5 to 99% by weight, based on mix IIa, of a polymeric composition IV obtained by polymerization of

b1) from 5 to 100% by weight, based on the composition IV, of condensation product V of

α) at least one compound VI which is able to condense with a carboxylic acid or a sulfonic acid as defined in β or a derivative or a mixture of two or more thereof, and

β) at least 1 mol per mol of the compound VI of a carboxylic acid or sulfonic acid VII which contains at least one free-radically polymerizable functional group, or a derivative thereof or a mixture of two or more thereof,

and

b2) from 0 to 95% by weight, based on the composition IV, of a further compound VIII, having a mean molecular weight (number average) of at least 5000 and polyether segments in the main chain or a side chain, where the proportion by weight of the mix IIa in the mixture Ia is from 1 to 100% by weight, and the layer is free of an electron-conducting, electrochemically active compound,

and

B) at least one second layer which comprises a polymeric binder and an electron-conducting, electrochemically active compound,

wherein the first layer or layers and the second layer or layers are joined to one another by one of the two methods V1 or V2:

V1) Lamination of the first layer or layers with the second layer or layers under the action of heat or under the action of heat and pressure,

or

V2) Corona treatment of the first layer or layers and the second layers or layers and subsequent bringing together of the corona-treated first layer or layers with the corona-treated second layer or layers.

19. (*amended*) A process for producing a composite as claimed in claim 13, which comprises joining the first layer or layers and the second layer or layers to one

another by hot lamination.

21. (*amended*) A process for producing a composite as claimed in claim 13, which comprises subjecting the first layer or layers or the second layer or layers or the first layer or layers and the second layer or layers to a corona treatment and subsequently bringing together the first corona-treated layer or layers to the second corona-treated or untreated layer or layers.
24. (*amended*) A method of producing an electrochemical cell in a sensor, an electrochromic window, a display, a capacitor or an ion-conducting film which comprises utilizing the composite of claim 13.
27. An electrochemical cell comprising a composite as claimed in claim 13 or a combination of two or more thereof.
38. (*amended*) A method of producing an automobile battery, instrument battery, planar battery or polymer battery which comprises utilizing the electrochemical cell of claim 27.
42. (*new*) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is a basic solid.
43. (*new*) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is selected from the group consisting of lithium borates, lithium aluminates, lithium aluminosilicates, mica, lithium zeolites, lithium carbides, Li_3N , lithium oxides, mixed lithium oxides, Li_2NH , LiNH_2 , lithium phosphates, Li_2CO_3 , lithium silicates, and lithium sulfates, and also two or more of the

abovementioned solids which conduct Li ions.

44. (new) A composite as claimed in claim 13, wherein the inorganic solid which conducts Li ions is selected from the group consisting of $\text{Li}_4\text{B}_6\text{O}_{11} \cdot x\text{H}_2\text{O}$, $\text{Li}_3(\text{BO}_2)_3$, $\text{Li}_2\text{B}_4\text{O}_7 \cdot x\text{H}_2\text{O}$, LiBO_2 , where x can be from 0 to 20; $\text{Li}_2\text{O} \cdot \text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$, $\text{Li}_2\text{Al}_2\text{O}_4$, LiAlO_2 ; lithium-containing zeolites, feldspars, feldspar substitutes, phyllosilicates and inosilicates, $\text{LiAlSi}_2\text{O}_6$ (spodumene), $\text{LiAlSi}_4\text{O}_{10}$ (petullite), LiAlSiO_4 (eucryptite), $\text{K}[\text{Li,Al}]_3[\text{AlSi}]_4\text{O}_{10}(\text{F-OH})_2$, $\text{K}[\text{Li,Al,Fe}]_3[\text{AlSi}]_4\text{O}_{10}(\text{F-OH})_2$; lithium zeolites in fiber, sheet or cube form; Li_2C_2 , Li_4C ; Li_3N ; LiAlO_2 , Li_2MnO_3 , Li_2O , Li_2O_2 , Li_2MnO_4 , Li_2TiO_3 , Li_2NH ; LiNH_2 ; Li_3PO_4 , LiPO_3 , LiAlFPO_4 , $\text{LiAl}(\text{OH})\text{PO}_4$, LiFePO_4 , LiMnPO_4 ; Li_2CO_3 ; Li_2SiO_3 , Li_2SiO_4 , Li_6Si_2 ; Li_2SO_4 , LiHSO_4 , and LiKSO_4 , and also mixtures of two or more of the abovementioned solids which conduct Li ions.
45. (new) A composite as claimed in claim 13, wherein the first layer or layers and the second layer or layers are joined to one another by the method V1 in the presence of a bonding layer or bonding layers.
46. (new) A composite as claimed in claim 45, wherein the bonding layer or layers is/are formed of polymeric compounds.
47. (new) A composite as claimed in claim 46, wherein the polymeric compounds are selected from the group consisting of polyethylene oxide; polyvinyl ethers; (co)polyacrylates, (co)polymethacrylates; polyvinylpyrrolidone; polyurethanes, wax-like (co)polyolefins; rubber-like materials; and polyisobutylene; and also

mixtures of two or more thereof.

48. (new) A composite as claimed in claim 46, wherein the polymeric compounds are selected from the group consisting of polyethylene oxide; poly(vinyl methyl ether), poly(vinyl ethyl ether), poly(vinyl propyl ether), poly(vinyl butyl ether), poly(vinyl isobutyl ether); polybutyl (meth)acrylate, polyhexyl (meth)acrylate; polyvinylpyrrolidone; polyurethanes, polyethylene, polypropylene waxes, polyisoprene waxes; rubber-like materials; and polyisobutylene; and also mixtures of two or more thereof.

49. (new) A composite comprising

Aa) at least one first layer which comprises a mixture Ia, comprising a mix IIa consisting of

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b) from 5 to 99% by weight, based on mix IIa, of a polymeric composition IV obtained by polymerization of

b1) from 5 to 100% by weight, based on the composition IV, of condensation product V of

α) at least one compound VI which is able to condense with a carboxylic acid or a sulfonic acid as defined in β or a derivative or a mixture

of two or more thereof, and

- β) at least 1 mol per mol of the compound VI of a carboxylic acid or sulfonic acid VII which contains at least one free-radically polymerizable functional group, or a derivative thereof or a mixture of two or more thereof,

and

- b2) from 0 to 95% by weight, based on the composition IV, of a further compound VIII, having a mean molecular weight (number average) of at least 5000 and polyether segments in the main chain or a side chain, where the proportion by weight of the mix IIa in the mixture Ia is from 1 to 100% by weight, and the layer is free of an electron-conducting, electrochemically active compound,

and

- B) at least one second layer which comprises a polymeric binder and an electron-conducting, electrochemically active compound,

wherein the first layer or layers and the second layer or layers are joined to one another by one lamination of the first layer or layers with the second layer or layers under the action of heat or under the action of heat and pressure, in the

presence of a bonding layer or bonding layers.

50. (new) A composite as claimed in claim 49, wherein the bonding layer or layer is/are formed of polymeric compounds.
51. (new) A process for producing a composite as claimed in claim 49, which comprises joining the first layer or layers and the second layer or layers and bonding layer or layers to one another by hot lamination.
52. (new) A process for producing a composite as claimed in claim 49, which comprises subjecting the first layer or layers or the second layer or layers or the first layer or layers and the second layer or layers to a corona treatment and subsequently bringing together the first corona-treated layer or layers to the second corona-treated or untreated layer or layers.
53. (new) A composite as claimed in claim 45, wherein the bonding layer or layers comprise(s) an inorganic solid which conducts Li ions and polymeric compounds.
54. (new) A composite as claimed in claim 49, the bonding layer or bonding layers comprise(s) and inorganic solid which conducts Li ions and polymeric compounds.